UNMELTED IMPACT EJECTA ASSOCIATED WITH THE AUSTRALIAN MICROTEKTITE LAYER; Jiquan Wu, 95 Gamble Ave., Apt. 417, Toronto, Ontario, Canada M4K 2H7, and B.P. Glass, Geology Department, University of Delaware, Newark, DE 19716

Australasian microtektites have been found in cores from nearly fifty sites in the Indian Ocean, eastern equatorial Pacific, and Philippine, Sulu, and Celebes Seas [1, 2, 3]. We previously reported the discovery of unmelted impact ejecta (shocked quartz, coesite, stishovite), in the > 125 µm size fraction of seven cores from the Australasian strewn field [4]. In six of the cores, unmelted impact ejecta were found associated with Australasian microtektites, but in one core unmelted ejecta, with the same stratigraphic age, based on magnetostratigraphy, were found without any associated microtektites. We report here the discovery of unmelted impact ejecta in three additional cores from the Australasian strewn field. The unmelted impact ejecta at one of the new sites (ODP 768) is associated with Australasian microtektites, but at the other two sites (V19-116 and V20-142) it is not. We also determined the abundance of unmelted impact ejecta in the 63-125 µm size fraction at two sites (V20-142 and ODP 769A) and we found, as expected, that the unmelted ejecta were 3-4 x more abundant in this size fraction than in the > 125 µm size fraction.

Orientation of planar deformation features (PDFs) were measured in 47 quartz grains using a spindle stage (Fig. 1). The number of sets of PDFs in a grain varied from 1 to 9 with 30 of the grains having 4 or more sets. We find that orientations with higher angles to the c-axis such as $r\{10\bar{1}1\}$, $z\{10\bar{1}1\}$and $\varepsilon\{11\bar{2}2\}$ are the most common and that $\omega\{10\bar{1}3\}$ and $\pi\{10\bar{1}2\}$ orientations are rare. The fact that the majority of the PDF orientations have high angles to the c-axis, as well as the common occurrence of coesite and rare stishovite, is consistent with a sedimentary source rock [5].

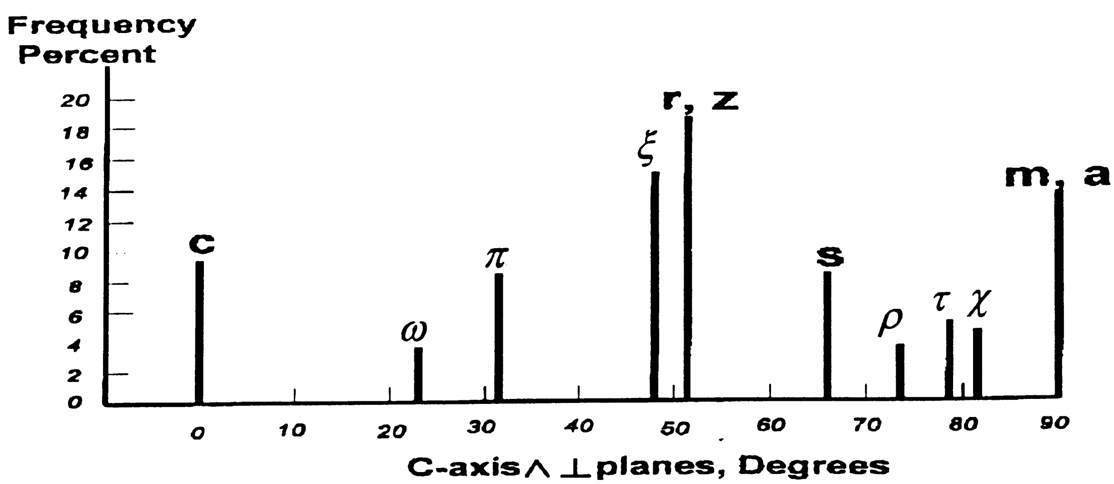

Figure 1. Frequency of indexed PDFs in 47 grains of shocked quartz from ten cores in the Australasian microtektite strewn field.

Glass and Pizzuto [2] used the geographic variations in concentration of Australasian microtektites in 42 cores to predict the location of the Australasian source crater. The source area was determined by picking hypothetical crater locations and regressing the concentration at each site versus the distance from the hypothetical crater location. This was repeated until the location was found that gave the highest r^2 value. The location that seems to best explain the geographic variations in microtektite concentrations is located in central Cambodia at about 12^oN. Lat. and 106^oE. Long. We used the same method to predict the location of the Australasian source crater using the geographic variation in concentration (number of ejecta grains/cm^2) of unmelted ejecta from 10 sites and found that the location that gave the highest r^2 value (0.89) is the same as that predicted using the microtektites (i.e., 12^oN. Lat., 106^oE. Long.). The concentration of unmelted ejecta varied from 6 to 146 grains (> 125 µm) per square centimeter.

The shortest and longest dimensions of each ejecta grain were measured and averaged to obtain a size for each grain. The sizes of the grains at each site were then averaged to get an average grain size for each site. The number of grains measured at each site varied from 3 to 59 with a total of 329 grains. The average size varied from 173 to 227 µm. We found that the average size decreased with distance from the hypothetical source area at 12^oN. Lat. and 106^oE. Long. -- log average size (µm) = 3.5 - 0.36 log distance (km), with an r^2 of 0.62.

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